FOREST PEST MANAGEMENT
Pacific Southwest Region

Report No. R93-09 3420 Pest Management

AN EVALUATION OF TREE MORTALITY IN THE LONG BELL AREA OF THE BIG VALLEY RANGER DISTRICT, MODOC NATIONAL FOREST

Dennis R. Hart, Entomologist

ABSTRACT

Current tree decline and mortality was evaluated in the Long Bell area of the Big Valley Ranger District of the Modoc National Forest. Many Ponderosa pine trees that appeared to be healthy when this area was marked for salvage in July had exhibited rapid crown deline and died within a period of two months. Conditions associated with this decline are: drought; the black pine leaf scale; the pine needle scale; the sequoia pitch moth; the pine needle sheathminer; the California flatheaded borer; the pine ips engraver; the western pine beetle; the mountain pine beetle; ambrosia beetles; and the red turpentine beetle.

Current tree mortality is associated with: drought, general crown decline caused primarily by pine needle scales, followed by rapid crown decline caused by flatheaded borer attacks to the limbs in the lower to mid-crowns of the affected trees. After several generations of flatheaded borer attacks to the limbs, layers of dead cambial tissue form on the trunks of the trees in the area of the mid-crown. This is followed by attacks to the lower bole by flatheaded borers and Dendroctonus bark beetles.

The general appearance of trees affected with this condition of decline is similar to crown conditions caused by black stain root disease.

INTRODUCTION

The Modoc National Forest requested an evaluation of the tree decline and mortality in the Long Bell area of the Big Valley Ranger District. On May 13, 1993 Dennis Hart, Entomologist with the Forest Pest Management Group from the Regional Office, and Chris Click, Silviculturist on the Big Valley District of the Modoc National Forest.

OBSERVATIONS

The area examined (T. 42 N., R. 5 E., Sections 10 - 15, 22-27, 34-36; T. 42 N., R. 6 E., Sections 7, 18-19, 30-31; T. 41 N., R. 5 E., Sections 1-3, 10-15; T. 41 N., R. 6 E., Sections 7 and 18) includes about 10,000 acres of second growth ponderosa pine. Many of these stands are stressed from being overstocked. The symptoms of tree decline and mortality in this area resemble those of black stain root disease, but root disease is not a problem in this area.

This tree decline was first noticed during August 1992. Chris Click established a sample of 106 trees exhibiting a range in severity of these symptoms of decline ranging from healthy to severe decline. This sample was established during the first week of September 1992. Each selected tree was numbered with a yellow water proof 5X5 card and yellow ribbon. Recorded variables are: DBH, total height, crown length, edaphic attribute (relative to lava reef), insect and disease activity, and basal area. Each sample tree was recorded with two color photographs: (1) total tree and (2) a close up of the bole. A 10% subsample of these trees included a photo close-up of the bole with tree number. This sample will be revisited every month and photographs will be taken to record the condition of these trees.

Dennis Hart, Chris Click, Bill Merrihew, Silviculturalist from the Supervisors Office of the Modoc National Forest, and others visited this area during September and October 1992 and May 12-13, 1993. During September and October of 1992 rapid crown decline and death of affected trees was observed. At that time the only condition that could be positivily linked to this condition was the pine needle scales: (1) the black pineleaf scale, Nuculaspis californica, and (2) the pine needle scale, Matsucoccus acalyptus, and a wide assortment of bark and wood boring beetles. These beetle attacks tended to be light, scattered, and not dense enough to be a serious threat to most of the affected trees.

At this time the condition of tree decline was determined to be a combination severe drought conditions, stand overstocking, and scale insects. The conditions associated with rapid crown decline followed by tree death was not determined at this time.

During the May 12-13 visit to this area six recently dead trees of Chris Click's 106 tree sample were felled and examined. The pest conditions on these trees were: five trees had severe infestations of the black pineleaf scale; five trees had moderate to severe infestations of the pine needle scale; all six trees suffered from very heavy attacks on the limbs in the lower to mid-crown areas by the California flatheaded borer, Melanophila californica; four trees had heavy flatheaded borer attacks on the trunk from lower to upper-crown; three trees had moderate attacks by the sequoia pitch moth, Vespamima sequoiae; three trees had moderate attacks by the pine needlesheath miner, Zelleria haimbachi; three trees had moderate attacks by the western pine beetle, Dendroctonus brevicomus; two trees suffered moderate attacks by the Ips pine engraver, Ips pini; one tree suffered a moderate attack by the mountain pine beetle, Dendroctonus ponderosae; four trees suffered heavy attack by the

red turpentine beetle, Dendroctonus valens; and one tree had an incipient infection of Armillaria root disease, Armillaria mellea.

CONCLUSIONS

This condition of rapid crown decline and tree death has three main stages: (1) the scale insects which cause general crown decline were able to establish themselves in the crowns of these trees due to stress factors such as droughty soils on the lava reefs, overstocked stands, and dusty conditions from the road. The long period of drought caused these stress conditions to have a much more severe effect on these stands; (2) rapid crown decline was caused by successive generations of flatheaded borer attacks on the branches of the affected trees in the lower to mid-crown regions; (3) tree death is caused by heavy attacks throughout the boles of the trees by flatheaded borers, heavy attacks by the red turpentine beetles, some of these trees also suffer moderate attacks by Ips and western and mountain pine beetles.

Trees in the upper crown classes in these stands ranging from 6 to 40 inches tend be the most severely affected by this condition.

Flatheaded borers are not aggressive insects. For then to cause this type of damage in stands, these stands have to be undergoing extreme stress.

Overstocking is causing a degree of stand stress. The average stand basal area is probably about 50 square feet per acre. This may be alittle high for stands under these conditions, especially growing on shallow, rocky soil, and having severely reduced crowns due to the scale insects. Although stocking pressure is causing a degree of stress, it is not causing severe stand stress.

Scale insects have been able to develop rapidly due to stress conditions, especially associated with this long period of drought. This along with the drought and other stress conditions has set these stands up for this condition of crown decline and mortality.

Bark beetle broods are not able to develop enough to produce large populations because they are overwhelmed flatheaded borer activity in the bark of the trees.

This condition of crown decline is most severe in the areas of the shallow soils of the lava reefs.

Many trees that are currently dead from bark borer and bark beetle activity still have green crowns.

When a tree only has retained the current years needles, and these needles are chloratic from scale insects, this trees will tend to die within a few months. When a tree has this condition, and the needles start to appear dried out, this tree is being attacked by flatheaded borers and will in all probability die within a short period of time.

When holes start to appear in the crowns of chloratic appearing trees, these holes are formed by flatheaded borer attacks to the branches of the trees.

MANAGEMENT ALTERNATIVES

The main consideration is to relieve the degree of stress in the stands in this area.

1. No Action. A large proportion of the trees in the upper crown classes in this area will continue to die over the next several years due to the build-up of stresses in these stands.

2. Salvage of Dead Trees. This will remove dead material from the affected stands, but will do little to relieve the stress conditions causing this decline and mortality.

3. Sanitation and Salvage. This will remove the trees that are expected to die in the near future and the recently dead trees, but it will do little to relieve the stresses causing this condition if a large percentage of the most severely affected trees are not removed from these stands.

4. Sanitation, Salvage and Thinning. This type of treatment should effectively relieve the stress in the stands in this area if they are uniformly thinned to at least 55% of normal basal area, trees exhibiting crown decline from scale insects, and crown desiccation and openings caused by flatheaded and twig borer attacks, and currently dead trees are removed.

Types of stand stress:

Shallow soil

Overstocked stands

Heavy scale infections

Prolonged drought

Flatheaded and twig borer activity

Shallow, droughty soils have reduced the carrying capacity for the stands in this area.

Reduced crown capacity from scale insect activity has seriously reduced the vigor of many of the trees in this area.

Severe and prolonged drought has weakened many of the most seriously stressed trees past the point of recovery. This is due to injury and reduced crown capacity caused by scale insects and flatheaded and twig borer activity.

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Reply To: 3420 Pest Management

Date: JUL 16 1993

Subject: An Evaluation of Tree Mortality in the Long Bell Area of the Big Valley Ranger District, Modoc National Forest (Rpt. No. R93-06)

To: Forest Supervisor, Modoc National Forest

The enclosed report documents an evaluation of the condition of accelerated rate of crown decline and tree mortality in the Long Bell area of the Big Valley Ranger District on the Modoc National Forest. Management alternatives are developed.

If you have any questions contact Dennis Hart at (415) 705-2574.

John Kliejunas

JOHN NEISESS, FPM Program Leader
State and Private Forestry

Enclosure